

MMS Environmental Studies Program

FY 2002 Prospectus

Prepared By:
Environmental Sciences Branch
Herndon, VA

August 2002

— **MMS ESP Research Mandate** —

Establish information needed for assessment and management of environmental impacts on the human, marine, and coastal environments of the OCS and potentially affected coastal areas.

(Outer Continental Shelf Lands Act, Section 20)

For more information on the MMS Environmental Studies Program, please contact:

Chief, Branch of Environmental Sciences
381 Elden Street (Mail Stop 4041)
Herndon, VA 20170-4817

Phone: (703) 787-1717

Fax: (703) 787-1053

MMS Environmental Studies Program

FY 2002 Prospectus

Introduction	1
ESP Overview	1
New Research Projects	
Gulf of Mexico Region	3
Alaska Region	7
Pacific Region	14
Headquarters	18

Introduction

As stewards of our Federal offshore lands known as the Outer Continental Shelf (OCS), the U.S. Department of the Interior's Minerals Management Service (MMS) is responsible for balancing the Nation's exploration, development, and production of petroleum energy resources and other marine minerals with the protection of the human, marine, and coastal environments.

MMS regulates exploration, development, and production activities on about 8,000 active leases including 4,000 production facilities to ensure that these activities are conducted safely and in an environmentally sound manner.

The MMS's environmental programs serve this important function by providing solid scientific information needed for critical program decisions that must, by law, accommodate this delicate balance. The commitment to environmental protection begins with the first steps in the leasing process and continues through to the end of the production activity with decommissioning/removal of the production structure. In support of this commitment, the MMS places a high priority on environmental and socioeconomic research and allocates approximately \$19 million annually to these efforts. The Environmental Studies Program goals, as specified in the OCS Lands Act as Amended (1978) are:

- to establish the information needed for assessment and management of environmental impacts on the human, marine, and coastal environments of the OCS and potentially affected coastal areas;
- to predict impacts on the marine biota which may result from chronic, low level pollution or large spills associated with OCS production;
- to monitor human, marine, and coastal environments to provide time series and data trend information to identify significant changes in the quality and productivity of these environments and to identify the causes of these changes.

This Fiscal Year (FY) 2002 Prospectus was prepared by the MMS Environmental Studies Program (ESP) to briefly describe new projects that will be undertaken this year.

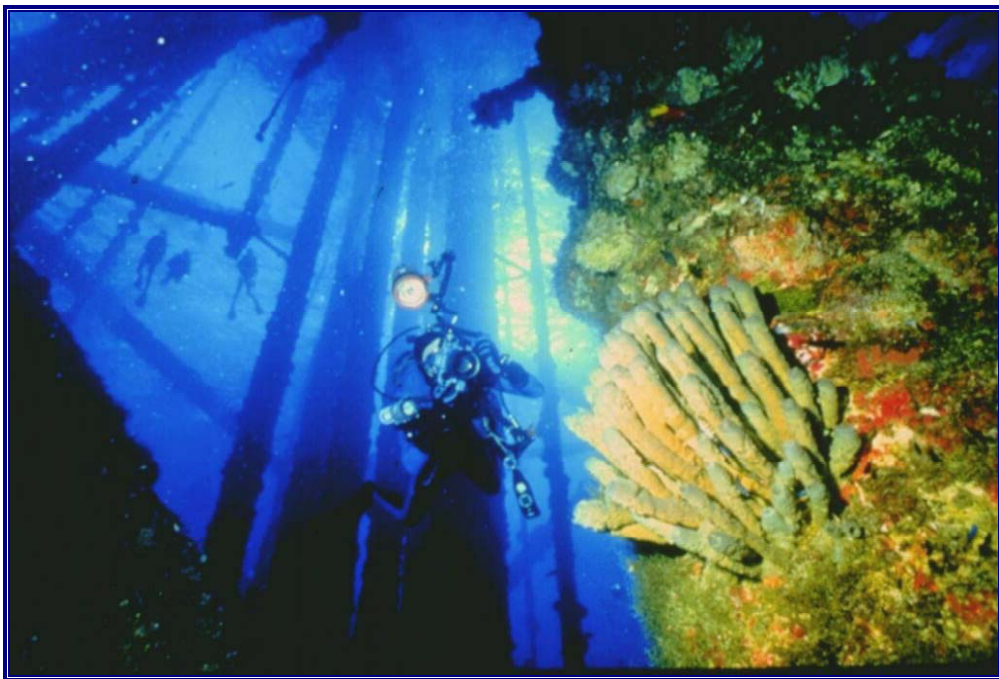
ESP Overview

In FY 2002, approximately 40 percent of the ESP budget will be available to start new projects. The new projects being designed involve a diverse range of activities including workshops, field studies, and modeling efforts. These new projects will be procured competitively, through cooperative agreements, and through interagency agreements and noncompetitive awards.

The MMS will continue to rely on regional Coastal Marine Institutes (CMI's) in Louisiana, Alaska and California to address many of the requirements for new information being developed. The CMI budget represents 20 percent of the overall ESP budget.

The Gulf of Mexico Region will continue to be the primary focus for research, with about 54 percent of the budget allocated to scientific research and information synthesis in the central, western, and eastern Gulf. The Alaska and Pacific Regions' studies will account for almost the same level as previous years (20% of the budget in Alaska and 13% of the budget in the Pacific).

New Research Projects



Gulf of Mexico Region

Explosive Removal of Offshore Structures: Information Search and Synthesis

Approximately 4,000 oil and gas structures exist on the U.S. Outer Continental Shelf (OCS). Explosive removals of offshore structures historically occur in shallower waters of the OCS. Industry is currently installing structures on the continental slope in search of new and untapped petroleum reservoirs, and generally moving their activities to deeper water. However, little information exists regarding how deepwater structures can or will be removed.

The objectives of this study are to locate, organize, annotate and synthesize historical and new information concerning aspects of using explosives to remove underwater structures, various explosive technologies, and the probable environmental impacts from these methodologies. An extensive search of published literature and unpublished data sets, reports and manuscripts, will be performed. Recent and ongoing research will be identified. Products to be developed from this study include an annotated bibliography, a final report, data sets, and visuals. This information search and synthesis is proposed to develop a rational basis for management decisions associated with the explosive removal of offshore structures and the protection of marine mammals and sea turtles.

The information sought in this study is widely distributed and is currently not available in a comprehensive form. This information will be used to support pending or future consultations with the NMFS concerning protected species and the explosive removal of offshore structures, and to develop flexible and suitable mitigation measures to enable industry to utilize explosives for removing offshore structures while also protecting marine mammals and sea turtles.

Pressure Wave and Acoustic Properties Generated by the Explosive Removal of Offshore Structure: Potential Effects on Protected Species

[deferred until FY 2003]

The most common method for removing OCS structures is severing them below the water line using explosives. The mitigation measures that have been developed are legally applicable for structure removals performed on the continental shelf. However, these mitigation measures are only practical for structures that occur in waters less than 180 feet in depth, and not for deeper waters where industry has placed and is presently removing offshore structures with explosives.

Recently, the National Marine Fisheries Service adopted criteria for “take” harassment zones based on tests of explosives that were detonated in open water. However, the MMS requires that offshore structures be severed 15 feet below the mudline. It is conceivable that the structure and surrounding sediments absorb and dampen the pressure wave and acoustic properties of an explosive used to remove an offshore structure. Therefore, the MMS needs data to determine the pressure wave and acoustic properties of explosives used to remove offshore structures so that the reputed dampening effects may be accurately measured. This data can then be used to more accurately calculate the “take” harassment zones for marine mammals and sea turtles specific to structure removals.

The objectives of this study are to: (1) quantitatively measure the underwater pressure waves and acoustic properties generated by the detonation of explosives used for offshore structure removals; (2) investigate the reputed dampening effects of the structure and surrounding sediments; and (3) provide the MMS with scientifically valid data that accurately reflect the methods used by industry to remove offshore structures with explosives, so that the “take” harassment impact zones of protected species may be more accurately calculated.

Long Term Monitoring at the East and West Flower Garden Banks

This is a continuation of a series of previous monitoring efforts developing a long-term database related to the environmental health of the East and West Flower Garden Banks. This study is important for validating the decision to relax the lease-stipulated requirement on the offshore industry to monitor exploratory or development and production activities within the 1-mile zone of the banks. Oil and gas activity in the area has continually increased in recent years. The East and West Flower Garden Banks have received an increasing variety of protective special area designations including Habitat Area of Particular Concern (HAPC) for Essential Fish Habitat (EFH) by National Marine Fisheries Service (NMFS) and Special Ocean Site (SOS) by the Environmental Protection Agency.

The objective of this study is to continue the long-term monitoring effort at the East and West Flower Garden Banks to detect any subtle, chronic effects from natural and man-induced activities that could potentially endanger community integrity.

Ongoing monitoring at the Flower Garden Banks is important to validate and to sustain our contention that the lease stipulations provide effective mitigation of impacts to the offshore environment and particularly, these sensitive and unique biological features.

Understanding the Processes that Maintain the Oxygen Levels in the Deep Gulf of Mexico

With increasing activities in deepwater Gulf of Mexico, a greater understanding of the environment below 1000 meters is necessary. Data collected during a 2000 cruise for the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology study confirms that the deepwater Gulf of Mexico has a relatively constant oxygen concentration of 5 ml/L. Since the effective sill depth of the source water is 1600-1800 meters and the deepest part of the Gulf is >3500 meters, the replenishment of oxygen to the deepwater is still not well understood.

The objective of this study is to understand the types and rates of processes occurring in the deep Gulf of Mexico that influence the levels of oxygen in deepwater and the balance that maintains this level. An understanding is important to enhance knowledge of fundamental processes and to describe the affected environment. The study would include: 1) literature review and evaluation of the available oxygen data, 2) development of a simple, conceptual model describing the sources and sinks of oxygen in the deep Gulf, 3) identify information needs for the conceptual model, and 4) design methods for filling the data gaps.

The information is needed to describe the affected environment in EA's and EIS's that cover ultra deepwater activities.

Sperm Whales and Their Response to Seismic Exploration in the Gulf of Mexico

The proposed study will focus on obtaining a detailed characterization of GOM sperm whales in terms of sex and age distribution in industry-active areas, genetic profiles, habitat use, and seasonal movement patterns. The normal behavior of whales will be studied and then compared to that observed when seismic vessels are operating in the study areas. Additional controlled experiments are planned to measure sperm whale response to a typical air-gun array. Research vessels and remote sensing devices will also obtain ambient noise measurements and physical oceanographic data to allow a detailed habitat characterization – mapping of both physical oceanographic features and ambient underwater noise levels will be correlated to sightings of sperm whales and all other cetaceans observed.

Although listed as endangered, worldwide sperm whale populations are increasing and ultimate regulatory determinations on possible effects at a population level will very much hinge on an understanding of the role of sperm whales relative to the worldwide population. Is the GOM a distinct stock and how many whales are in the GOM? How sperm whales react to seismic operations and other manmade noise is mostly conjecture. This study is intended to immediately address this concern and will provide information necessary for informed Section 7 consultations and possible MMPA take authorizations associated with deepwater operations.

New Research Projects



Alaska Region

Persistence of Crude Oil Spills on Open Water

The MMS typically evaluates a range of time periods such as 1, 3, 10, and 30 days to analyze the effects of open water oil spills in EIS's and EA's. State-of-the-art oil weathering models such as those currently used by MMS and NOAA only address initial weathering, the evaporation and vertical dispersion, and are not useful to determine the end point for trajectory modeling of oil spills on open water. Only for the lightest crude oils are evaporation and dispersion going to be useful for determining the persistence of crude oil on open water. For heavier oils, these models essentially project that even a one-cup spill would create a permanent slick (which may continue to expand). None of these models track slick integrity. Nor do databases for existing weathering models and other databases maintained by MMS and others compile the necessary spill information as to when slicks visibly dissipate as function of time or spill size.

The objective of this study is to collate and analyze historical data on the persistence of crude oil on open water primarily in relation to spill size. Additional factors that relate the persistence of crude oil on open water will be identified and analyzed. For example, the persistence of the *Exxon Valdez* crude in Prince William Sound after the first few weeks was due to re-oiling from oil stranded on surrounding shoreline rather than from the initial spillage. This study will provide historical validation for determining the persistence of crude oil spills *on open water* for setting end points for the trajectory modeling of various sizes of crude oil spills.

This information will provide historical validation to determine the most appropriate time periods for oil spill trajectory modeling given an assumed spill size. This information is relevant to all Lease Sale and Development EIS's and EA's.

Workshop on Sea Ice Circulation/Interaction Modeling for Nearshore Beaufort and Chukchi Seas

Most basin-scale dynamic-thermodynamic models in general use relatively simple thermodynamics and ice thickness distribution approximating the ice as slabs of a one to few mean thickness' plus open water. While sufficient as a first approximation of the arctic ice pack, this treatment lacks the ability to sufficiently resolve the spectrum of ice thickness from thin new ice to thick ridged ice to fast ice that have been observed. In addition, the ice models in existing state-of-the-art coupled ice/ocean models, including current Rutgers and CMI models contracted by MMS, are based on empirical ice physics valid at a 100-km scale and extrapolated to smaller grid dimensions.

The objective of this study is to conduct a workshop on state-of-the-art of ice or ocean-ice models. This workshop would address how existing, new, or proposed models could be applied to the nearshore Beaufort and Chukchi Seas to meet MMS's needs for oil spill trajectory modeling in ice, including in and among the barrier islands. The workshop participants would make recommendations on "best modeling approaches" based on the MMS's ice modeling needs.

This information will allow the MMS modeling group and the Alaska OCS Studies to make an educated decision on the best path to proceed for modeling the nearshore Beaufort and Chukchi Seas.

Surface Circulation Radar Mapping in Alaskan Coastal Waters: Planning/Feasibility Study

Over the past 25 years, oceanographic radar techniques (Coastal Ocean Dynamics Application Radar [CODAR] and Ocean Surface Current Radar [OSCR]) have been developed and improved to where detailed, gridded, 2-dimensional maps of surface circulation can be provided and recorded in real time. CODAR was partially developed in work for MMS in Cook Inlet two decades ago, but that developmental system did not provide useable data. More modern radar systems have been successfully used in MMS-funded studies in offshore North Carolina, Central Gulf of Mexico and offshore Southern California.

Several entities, including MMS, NOAA, the Prince William Sound Oil Spill Recovery Institute, the University of Alaska Fairbanks, and oil industry have expressed interest in using circulation mapping radar techniques in Alaskan coastal waters, but no user-group or specific program has been developed for radar use. The radar units are expensive and cost and use-sharing rental agreements among multiple users is a preferred approach.

The objectives of this feasibility study would be to develop an Alaska circulation-mapping-radar users group and develop cost-effective strategies for radar mapping in the vicinity of likely oil development in the Beaufort Sea and for Cook Inlet OCS and adjoining waters. Sharing and multiple use is necessary to reduce rental cost of the radar system. Other members of the users group may have interests in other waters. A Phase II program, to display radar systems, could result from this study.

Information obtained from this study will be used by Alaska OCS Region staff in preparing future development EIS's, lease sale EIS's under the next 5-year schedule, and in reviewing and improving oil-spill-contingency plans.

Beaufort Sea and North Slope Pipeline GIS Database

The MMS has primarily used the historical spill record on the OCS as an indicator of future spill occurrence rates on the OCS. This spill record does not include pipeline spills shoreward of the OCS, in State waters, or on land. The MMS intends to calculate spill rate occurrence based on Regional considerations, such as the Alaska North Slope production and pipeline experience, and to include all major pipeline spills, both onshore and offshore in environmental impact assessment. The first step in this process was a prior study (OCS Study MMS 2000-007) in FY 1999-2000 to collate available information on oil spills of at least 100 barrels (bbl) and to provide preliminary evaluation of spill occurrence rates.

One objective of this prior study that could not be accomplished was to evaluate usefulness of pipeline length as predictor or co-predictor (with pipeline throughput) for North Slope and Trans-Alaska Pipeline (TAP) spillage. This objective required concomitant pipeline segment throughput and pipeline segment length information at yearly or better intervals. The prior study

found that information on when individual pipeline segments were constructed was not compiled and available from industry or other sources.

This study is in two Phases. Phase II will not be funded unless significant information is deemed obtainable through the efforts of Phase I..

The Oil-Spill-Risk Analysis (OSRA) is a cornerstone to regional EIS's environmental assessments, and oil-spill-contingency planning. Information from this study will be used by Alaska OCS Region staff in preparing future development EIS's, lease sale EIS's under the next 5-year schedule, and in reviewing oil spill contingency plans.

Polar Bear Feeding and Monitoring

Polar bears are an integral component of the arctic marine environment and serve as an indicator of contamination, climatic change, and other disturbances to the Arctic ecosystem. They spend most of their time on drifting pack ice and feed primarily on ringed seals (*Phoca hispida*) and bearded seals (*Erignathus barbatus*). In Alaska, polar bears have also been observed feeding on stranded marine mammal carcasses during fall months while traveling along the coast and barrier islands of the Beaufort, Chukchi, and Bering Seas. An increase in polar bear numbers occurring in coastal areas, as well as more protracted use of the coastline and barrier islands of the Beaufort Sea has been noted in recent years. The near shore environment is an area that is subject to oil and gas development and other anthropogenic activities that have the potential to impact polar bears and their foraging habits. With additional information on the importance of the study area to ecology of polar bears, alternative mitigation options for future Beaufort lease sales may be feasible.

A two-part study is planned. The purpose of the first task is to facilitate discussion and evaluation of potential monitoring plans for polar bears living in areas of potential oil and gas development in the Beaufort Sea Planning Area. The approach will be to hold a workshop in Anchorage, Alaska, during 2002 to bring together individuals knowledgeable about polar bear ecology and behavior to promote consensus regarding appropriate steps to be taken to monitor the long-term health of the southern Beaufort Sea polar bear population.

The purpose of the second task is to provide and augment scientific knowledge about the demography and behavior of polar bears feeding on stranded bowhead whale carcasses along the coastline of the Alaskan Beaufort Sea in areas of potential oil and gas development. The objectives of the second task are to:

- determine the demographic characteristics of polar bears feeding on stranded bowhead whale carcasses on Barter and Cross Islands during fall months;
- determine polar bear habitat use (coarse scale, e.g. beach, upland, marine ice, or water) and related activity patterns at Cross and Barter Islands; and
- determine the magnitude of interchange of polar bears between Barter Island and Cross Island during fall months.

Information and annual reports from this study will be used in the preparation of draft and final Environmental Assessments (EA) supporting activities related to Beaufort Lease Sales expected to be held during 2003 and 2005. Study information will also be used in writing post-lease Environmental Impact Statements and EA's and in reviewing oil-industry plans for exploration,

development, and transportation in the Beaufort Sea. This information will also be used for contingency planning and to manage bear-human interactions.

Subsistence Mapping of Nuiqsut, Kaktovik and Barrow: Past and Present Comparison

MMS conducted studies providing detailed mapping of a wide range of subsistence activities for Nuiqsut, Kaktovik, and Barrow about 1990. Information is also available from recent subsistence scientific, private, and government sources. This study will use information from and build on the ongoing study "Reference Manual and GIS Overlays of Oil-Industry and Other Human Activity (1970-1995) in the Beaufort Sea." It will also coordinate with the documentation of subsistence activities at Cross Island, which is part of the ongoing ANIMIDA study.

The objectives of this study are to 1) map the geographic pattern of use of subsistence hunters and fishers, and possibly occurrence of subsistence resources, 2) identify potential alterations in harvest use and seasons for all important species, and 3) assess relative nutritional and cultural importance of different species.

MMS will use the comparative time series information to assess cumulative sociocultural effects for NEPA documentation for lease sales and development projects in the Beaufort OCS. Also, MMS, in cooperation with the North Slope Borough and other management agencies, can use the information on specific subsistence areas to advise the oil and gas industry on planning of their activities so as not to disturb wildlife habitat and respect the Native culture.

Use of the Beaufort Sea by King Eiders

Although the king eider population appeared to remain stable between 1953 and 1976, a recent analysis of migration counts off Point Barrow, Alaska determined that king eiders have declined 56% (3.9% per year) from approximately 802,556 birds in 1976 to about 350,835 in 1996 (Suydam et al. 2000). King eiders migrate eastward along the Beaufort Sea during May-June to arctic nesting areas in Alaska and Canada. During molt-migrations in late summer and fall-migration (July-August), eiders move westward along the Beaufort Sea coast to overwintering areas in the Chukchi and Bering Seas. Although migration count data have been collected at Point Barrow intermittently since 1953, little information exists regarding the importance of the Beaufort Sea to king eiders in other locations.

Petroleum related exploration and development has the potential to affect king eider populations. For example, the vulnerability of king eiders to an offshore oil spill was verified when at least 1,600 king eider carcasses were found on St. Paul Island following an oil spill February 1996. Other effects could result from disturbance of resting or migrating flocks and death of individual birds due to strikes on offshore structures.

The objectives of this study are 1) to document timing and distribution of spring and fall migrating king eiders in nearshore and offshore Beaufort Sea habitats, and 2) locate and describe staging, molting and wintering areas.

This study is envisioned as a cooperative activity with key organizations potentially including: MMS, University of Alaska CMI, North Slope Borough, FWS, Canadian Wildlife Service, and

USGS Biological Resources Division. The study will use multiple methods to determine habitat use patterns and locate the migration corridor for king eiders.

Because basic biological parameters (i.e., population status, survival estimates, migration routes, and habitat requirements) for king eiders in the Beaufort Sea have been poorly described, assessment of impacts of offshore oil development are very limited in regard to protecting the species. Increased knowledge of this species could be incorporated with data being collected by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service to better assess impacts.

North Slope Borough Economy: 1975 to Present

A descriptive characterization of historic and recent North Slope economic activity due to onshore activities is necessary in order to evaluate relative significance of projected offshore development. The anticipated decline in oil production may be offset to a degree by production of natural gas from Prudhoe Bay and surrounding fields. The major oil and gas companies are seriously considering natural gas production as of the year 2000. In 2000 projections for demand for natural gas in the Lower 48 States is anticipated to be sufficient to warrant such production. This could increase the NSB revenues.

The objectives of this study are to 1) Describe revenues and expenditures of the North Slope Borough, 1975 to the most current year available; 2) portray how the North Slope Borough, as the local government, and individuals and households anticipate dealing with decline in revenues from the oil industry; 3) describe the structure of the NSB economy and changes to the structure, 1975 to the most current year available, and 3) provide a comparative basis for assessing potential economic effects of upcoming offshore oil and gas activity.

This study will be useful to MMS in assessing potential economic impacts of OCS development activity on the NSB and NSB residents with respect to revenues and expenditures, employment, subsistence and migration. It will provide a region-wide perspective of the economic effects of recent on-shore oil and gas development against which upcoming OCS economic effects may be gauged.

Drifter Testing and Evaluation for Verification of an Oil Spill Trajectory Model in the Cook Island and Shelikof Strait

Over the past eight years, MMS has deployed several hundreds of satellite-tracked drifters for the purpose of measuring the surface currents and simulating oil spills in the Gulf of Mexico. The purpose of these activities was the testing, evaluation, and improvement of MMS's Oil Spill Risk Analysis (OSRA) model applied to the Gulf. However, no such evaluation study has been performed yet in Alaskan waters. Given the considerable differences in the physical oceanographic setting of these two regions, it is necessary to perform the same kind of evaluation of the OSRA model applied to Alaskan waters.

Past studies provide too little information for a comprehensive evaluation of MMS's oil-spill modeling in this area. Also, there have been no Lagrangian current measurements in the middle and upper Cook Inlet. This study emulates the excellent drifter studies performed in the Gulf of

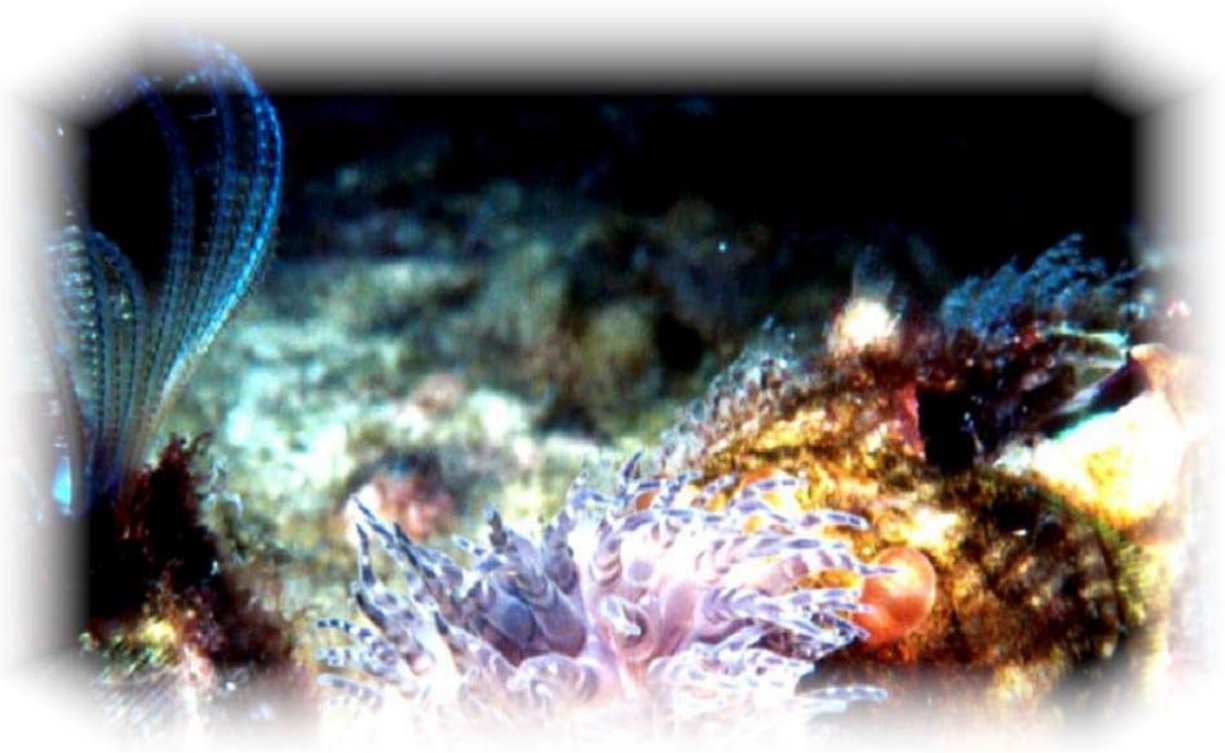
Mexico and will help MMS improve its OSRA conducted in support of lease sales in the Alaska Region.

The objective for this study is the acquisition of a one-year-long, synoptic, Lagrangian realization of the mesoscale and tidal currents in the Cook Inlet and Shelikof Strait and concurrent meteorological observations, and oil-spill simulations numerous enough for a statistical evaluation of MMS's OSRA model applied to Alaskan waters.

The surface currents will be observed by aircraft-deployed water-following (SCULP-type) drifters as done in the SCULP and NEGOM projects in the Gulf of Mexico, along the inlet and strait. The deployment scheme may be adjusted later in the project if the earlier deployed drifter tracks suggest a better sampling scheme. The drifters will be tracked by the ARGOS system employing "multi-satellite" service in order to resolve the strong tidal signal in the currents better. At selected locations, oil-following "ARGOSPHERE-type" drifters will be deployed in Cook Inlet and in the Shelikof Strait. Deployments will be concurrent with SCULP drifter deployments.

Finally, NOMAD-type meteorological buoys will be deployed in the area for the one year of drifter observations. The National Data Buoy Center (NDBC) will install the buoys and provide MMS with the digital data. One mooring will be deployed in each of lower Cook Inlet and the Shelikof Strait. Middle Cook Inlet may use an oil-platform based meteorology station and upper Cook Inlet a land-based meteorology station to avoid the seasonal ice pack.

New Research Projects



Pacific Region

Environmental Mitigation Monitoring

This study is a continuation of the field analysis segment of an earlier 4-year study of the same title which occurred between 1997 and 2000. The study goals are to observe, sample, and/or monitor postlease OCS oil and gas operations in the Pacific OCS Region to determine environmental compliance (MMS regulations, lease sale stipulations, NEPA requirements, and non-MMS agency requirements, etc.) with mitigation measures or project conditions and their effectiveness.

Environmental compliance monitoring data would be used by the MMS to evaluate mitigation measures and project conditions of postlease OCS oil and gas operations. In order for MMS to make better decisions on oil and gas postlease operations, the Agency needs to monitor and observe the operations in the field for environmental mitigation compliance and to determine effectiveness of the measures. Information from environmental mitigation monitoring studies would help decisionmakers to develop more feasible and scientifically defensible mitigation measures and project conditions for future oil and gas operations.

A Synthesis of the Distribution of Hard Bottom Communities in the Santa Barbara Channel and Santa Maria Basin Compiled from Existing Data from Biological Surveys and Environmental Studies

The first site specific biological survey conducted in the Santa Maria Basin occurred in 1982 on Leases OCS-P 0404, 0405, 0410 and 0411; entitled, Biological Survey on Megafaunal Species. The survey was required in order to ascertain the extent of a large rocky feature, its associated community of sessile organisms, and fish, in water depths ranging from 900 to over 1,00 feet and to determine the potential impacts from exploratory drilling on this community. This ambitious survey was followed by some 17 other biological surveys, which were required for both exploratory and development projects. Nearly 200 videotapes of various formats, written reports, slides, and maps were generated.

The objectives of this study are to: 1) compile this information into a synthesis correlated with latitude, water depth, sedimentation and other factors and, 2) determine the commonalities and differences among the communities found on the hard bottom features in the Pacific Region.

One of the driving forces behind requiring biological surveys is the concern that the communities are rare, contain long-lived species and therefore require protection. This study will help to increase our understanding of these communities and help MMS scientists to properly mitigate potential impacts. Lastly, gaining an overall view of the patterns of communities would provide valuable scientific information useful to government, academia and industry.

Shoreline Assessment of Changes in Rocky Intertidal Communities in the Southern California Bight (MARINE)

In 1996 MMS sponsored a multi-agency workshop which led to the development of MARINE – the Multi-Agency Rocky Intertidal Network. Presently, 16 local, State and Federal agencies and private organizations monitor 61 sites on the mainland and adjacent islands. Counties are active participants, both in terms of funding and personnel participation. A Steering Committee,

Science Panel, and Database Panel made up of academic, agency and private scientists provide guidance for MARINE on a volunteer basis. Goals of MARINE include standardization of field protocols, a united data management system and publication of peer-reviewed papers on the health of the shoreline rocky intertidal communities in the southern California Bight. For efficiency and cost-effectiveness, this contract will integrate ongoing monitoring at MMS sites and regional MARINE tasks.

The objectives of this study are: 1) to monitor rocky intertidal communities adjacent to producing OCS facilities on an ongoing basis, 2) to evaluate long-term changes in Southern California by resampling BLM benchmark sites, and 3) to further MARINE goals by providing for ongoing coordination of MARINE panels, facilitating joint MARINE peer-review publications and conducting comprehensive surveys at MARINE sites.

Ongoing biannual monitoring of existing rocky intertidal sites in San Luis Obispo, Santa Barbara, Los Angeles, Ventura and Orange Counties from fall 2001 to Spring 2003 includes ten sampling visits for each of the 21 sites. Fixed photoquadrats of barnacle, mussel and algal communities are photographed for lab analysis; counts and measurements are made in line, irregular and circular transects of species such as seastars, abalone, limpets, and surfgrass; motile invertebrates are counted in the photoquadrats; full site photos are taken. Specific studies or additional protocols for other species are expected be added to the routine monitoring effort to increase our ability to address questions about the health of these communities. Annual data reports and periodic analysis reports would be prepared for MMS.

This study provides the information essential for determining biological impacts to shoreline resources from an oil spill. The extent and spatial coverage of the data allows us to distinguish between biological effects stemming from oil spills vs. those from natural changes such as the El Nino storm events (Raimondi, 1998). It also provides valuable information about the status and trends of the biological resources adjacent to OCS operations. This information is critical during an oil spill to assess damages to the shoreline.

Blended Observations and Model Based Synoptic Current Fields for Advanced Predictive Skill

The MMS has entered into a series of Cooperative Agreements (CA) with the Scripps Institution of Oceanography, University of California (1991 to 2002) to study the oceanic circulation in the Santa Barbara Channel (SBC) and Santa Maria Basin (SMB). This work was done in response to recommendations by the National Research Council (NRC, 1989 and 1990), through initial guidance by several workshops conducted in 1990 and seven Quality Review Board meetings held during the conduct of the overall study. A combined fieldwork-observation analysis and numerical modeling effort supported by these CAs has led to tremendous advances in our understanding of the regional circulation in this area of active leases. Under the present CA, all modeling work will end in September 2001 and all analysis of field observations in the following year.

The objectives of this study are to maximize the predictive skill of MMS's OSRA and NOAA's GNOME oil spill trajectory models for both the SBC-SMB and greater central California coast-

Southern California Bight (CCC-SCB) areas by maximizing the accuracy of synoptic current fields constructed developed for these areas.

The proposed project will provide for the development of a blended data/model product designed for MMS oil spill trajectory modeling needs. This will be done by: (1) combining data and model in a dynamically consistent manner to maximize the predictive skill of model trajectories within the SBC-SMB region, and (2) using numerical modeling and sparser temperature/conductivity data sets to provide useful estimates of surface parcel trajectories in the greater CCC-SCB area.

The higher accuracy obtained by these blended data-model products is required for this particular area due to the high complexity of the oceanographic regimes and the proximity of the many sensitive natural resources in the area. This information will be used to make more informed and scientifically defensible assessments used in the preparation of the required NEPA documents: environmental impact statements, environmental assessments, and records of decisions.

New Research Projects



Headquarters

Socioeconomic Analysis Projecting Offshore Exploration Activity

Future exploration and production (E&P) activity are important inputs for methods of forecasting offshore production and estimating regional, socioeconomic impacts of Federal offshore programs and policies. To date, Environmental Studies research has focused on the “downstream” linkage of onshore activities (shipbuilding, pipelines, etc.) and regional impacts. The proposed research will focus, instead, on projecting the offshore activity that starts the chain of impacts.

Projection of E&P in all its phases is too large and complex a subject to address with a single research contract. We envisage pursuing the research in 2 steps: 1) Begin with exploration projection. 2) At a later date, turn to development and production projection.

This study plan addresses the first step, exploration.

The Resource Evaluation offices prepare several exploration projections, using the same method. The projections apply to assessments of OCS resources, to EIS's, and to 5-year lease sale planning. The typical projection covers about 20 years. The method normally begins with a probabilistic estimate of resources (undiscovered as well as known) in a number of areas and depths. For each such category, resources that might be profitable to find and produce for several different oil price levels are calculated using representative field cash-flows. Future exploration for undiscovered resources is extrapolated from trends relating to lease sales – e.g.; a larger number of leases sold implies more drilling. The end result is “E&D scenarios” that include annual projections of wells drilled.

The issues where lack of information is most troublesome take the form of possible incentives to explore and produce. We focus on the supply-side incentives that MMS is authorized to employ. Incentives are typically modified financial lease terms, such as reduced royalty. These policies, sometimes complex, are carefully tailored to categories of area, water depth, or well depth. We want to project how exploration in the categories is accelerated or increased by some specific incentive. The existing method does not have this capability in full.

Existing models address exploration in terms of drilling variables, such as number of wells or feet drilled. However, exploration relies increasingly on nonintrusive techniques: seismic surveys, etc. It would be useful to include a variable in the model that represents spending on these surveys.

For the present proposal regarding exploration projection, research should start with the existing methods that the RE office uses to project exploration. That method's advantages should be retained, and it can be given added capability to reflect aspects of exploration activity not readily simulated with the existing method. Other models can give helpful prototypes and should be examined. The end result should be a working model that gives the information needed.

Projection of future exploration activity is an important input and integral step in forecasting production and estimating regional, socioeconomic impacts of Federal offshore programs and policies. The reasonableness and accuracy of the impact estimates depends on the inputs, including projected exploration activity. The proposed research will improve our method of projecting the exploration activity that starts the chain of impacts following lease sales. Also, projected exploration activity is an indicator of the effect of incentives or other economic policy measures on the offshore oil industry. The information that would be provided by a model built

according to this proposal would be valuable to determining lease term policies, such as royalty relief.

Environmental Investigation of the Use of Shoals Offshore Maryland by Mobile Benthos and Finfish Species

MMS has for several years worked cooperatively with coastal States through their respective geological surveys to locate potential sand borrow areas in Federal waters offshore their respective coasts. This has resulted in the identification of many submerged shoals, which are composed of compatible sand for coastal and beach restoration purposes. However, numerous species of fish and other mobile organisms are known to inhabit these shoal areas and the potential for long-term adverse impact associated with an offshore dredging operation does exist if the dredging operation were to result in a significantly altered physiography/topography.

The objective of the study is to gather field information to answer the following questions:

Do the shoals located on the mid-Atlantic seafloor: 1) serve as orientation features for finfish and mobile epi-benthos to orient to during migrations or other population movements; 2) serve as a staging ground for various species of finfish and mobile epi-benthos during migrations or other population movements; 3) provide needed physical habitat structure for a variety of marine species, (this structure would otherwise be lacking on the largely flat seafloor); 4) serve to maintain physical habitat diversity by contributing to maintenance of adjacent lows and seafloor flats.

Field data will be collected in and around several shoals offshore southern-most Delaware and offshore Maryland. Bathymetric data will be collected to define the physiography of the shoals. Grab sample, side-scan sonar, video sled, and trawling information will then be collected to assess the use by various fish species relative to highs and the lows (ridges and troughs areas) within the shoal areas

MMS, in its role of regulator and environmental steward, must ensure that no adverse effects occur to the fish populations, which inhabit the shoal areas identified as potential sources of beach-compatible sand. MMS has actively worked with the U.S. Army Corps of Engineers and NMFS during project/negotiated lease development and the EFH consultation process using whatever information is currently available to avoid impacts to various fish species in shoal areas proposed as sand borrow sites. Little information is available, however, relative to the use of these offshore shoal areas by fish and various mobile species.

Numerous negotiated agreements are already being considered for the use of offshore shoal areas as a source of sand for nourishment activities. Future requests for such agreements will continue to be submitted on a regular basis. The information collected from this analysis will be incorporated into the environmental analyses required under NEPA, as well as being used during the required EFH consultation. The information will be invaluable in serving to avoid or mitigate any potential adverse impacts to various fish species in shoal areas proposed as sand borrow sites.

Field Testing of a Physical /Biological Monitoring Methodology of Offshore Dredging to Avoid Adverse Impacts

Many of the submerged shoals located on the Federal Outer Continental Shelf are expected to be long-term sources of sand borrow material for coastal erosion management and may be used almost on a continual basis, in some cases, by coastal communities. An example of such a shoal is Sandbridge Shoal, offshore Virginia where the City of Virginia Beach is looking towards the shoal as a source of material for both the resort strip and Sandbridge Beach. In addition, the U.S. Navy has and will continue to use the resource to renourish the beach at its Dam Neck Training Facility. To date, coastal erosion management projects utilizing Federal OCS sand resources have been examined on a case-by-case, project-specific basis. These resources must be managed on a long-term, system-wide basis to ensure that adverse environmental impacts will not occur as a result of continual and prolonged use. Sand sources that are to be used repeatedly may require additional biological and physical monitoring to ensure that adverse impacts to the marine and coastal environments do not occur.

The objective of this study is to field test and validate the recommended biological and physical monitoring protocols provided to the MMS by the RPI project team. The test will be used to determine if the data collected after implementation of the recommended protocols can be used by technical and non-technical personnel to manage over the long-term, OCS borrow sites in such a manner as to preclude or minimize adverse environmental impacts to the physical and biological environments. The test may point out procedures/mechanisms which should be modified to yield information which may be more scientifically appropriate or accurate for making technical or management decisions and will be used to evaluate the validity of the pre-mining predictions presented in MMS environmental assessments.

This study is needed to examine a potential means of evaluating the long-term effects of dredging within the same borrow area in order to preclude or minimize long-term adverse environmental effects.. Validation/development/implementation of appropriate monitoring measures addresses the need for environmental protection during long-term development of various marine mineral resources and may assist the negotiation process for non-competitive leases for marine resources for beach nourishment by pointing out mitigation measures applicable to specific projects or time windows or periods within which specific areas should not be dredged.

Worldwide Analysis of Shipwreck Damage Caused by Offshore Dredging: Recommendations for Pre-operational surveys/mitigation During Dredging to Avoid Adverse Impacts

In many of the areas being considered as potential sand borrow areas for beach nourishment, numerous shipwrecks are known to be present.

Offshore dredging has been known to result in the burial of wrecks by as much as 10 feet of sand and recovery is unlikely given the replenishment schedules and reuse of many borrow areas over a period of time. Environmental groups in New Jersey have cited some of the replenishment projects in the State as being the biggest destroyers of fisheries habitat in New Jersey history. Wrecks have also been impacted directly by dredges. It would appear, therefore, that the buffer

zones allocated for wrecks might be inadequate to protect these resources due to the large size and inaccuracy of the dredges. In addition, the current MMS requirements for archaeological surveys may not be adequate, given the scale and complexity of a typical beach dredging or offshore construction aggregate operation, to accurately map shipwrecks within sand lease areas so as to protect these resources.

The objective of the study is to provide a plan by which the MMS can ensure that shipwrecks that exist within potential Federal OCS sand borrow areas or aggregate areas are not adversely impacted by offshore dredging operations. The study would involve a worldwide search of literature which describes shipwreck damage resulting from offshore dredging operations, as well as a review of current practices and procedures to mitigate against adverse impacts. INTERMAR has been using the current archaeological survey specifications which were developed for oil and gas operations; these specs may not be adequate to protect shipwrecks given the scale of typical offshore dredging operations.

Workshop on the Long-term Weathering of Oil Spills

This workshop, to be conducted jointly with the National Oceanic and Atmospheric Administration (NOAA), will review what is known about the long-term processes controlling the fate of open water oil spills.

A critical component in modeling the transport of spilled oil is the determination of the length of time that the resulting slick will exist. Eventually spilled oil dissipates from the water surface and is no longer transported by winds and surface currents. Currently, the MMS Oil Spill Risk Analysis (OSRA) model simulates trajectories for 3-, 10-, and 30-day time periods to represent the persistence of spilled oil. These periods were developed almost 20 years ago and have been criticized by both industry and the environmental community. The MMS is now analyzing possible spills from deepwater operations that have the potential to be a greater volume and be transported greater distances before the slick breaks up compared to historical marine spills.

The objective of this workshop is to initiate discussions among spill experts to determine what is known about the persistence of large open water oil slicks, to assess what is the state of knowledge of existing long-term weathering predictions for such spills, and to prioritize our information needs and research. The workshop will result in a recommended approach on how to best predict the fate of high volume openwater spills and how we should incorporate long term weathering processes into present oil spill fate and behavior models.

Experts in the field, as determined by the panel, will be invited to give individual presentations supplemented by panel discussions, particularly with regard to recommendations for information needs and research. A contractor would be hired to record and transcribe the presentations and discussions.



The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.

